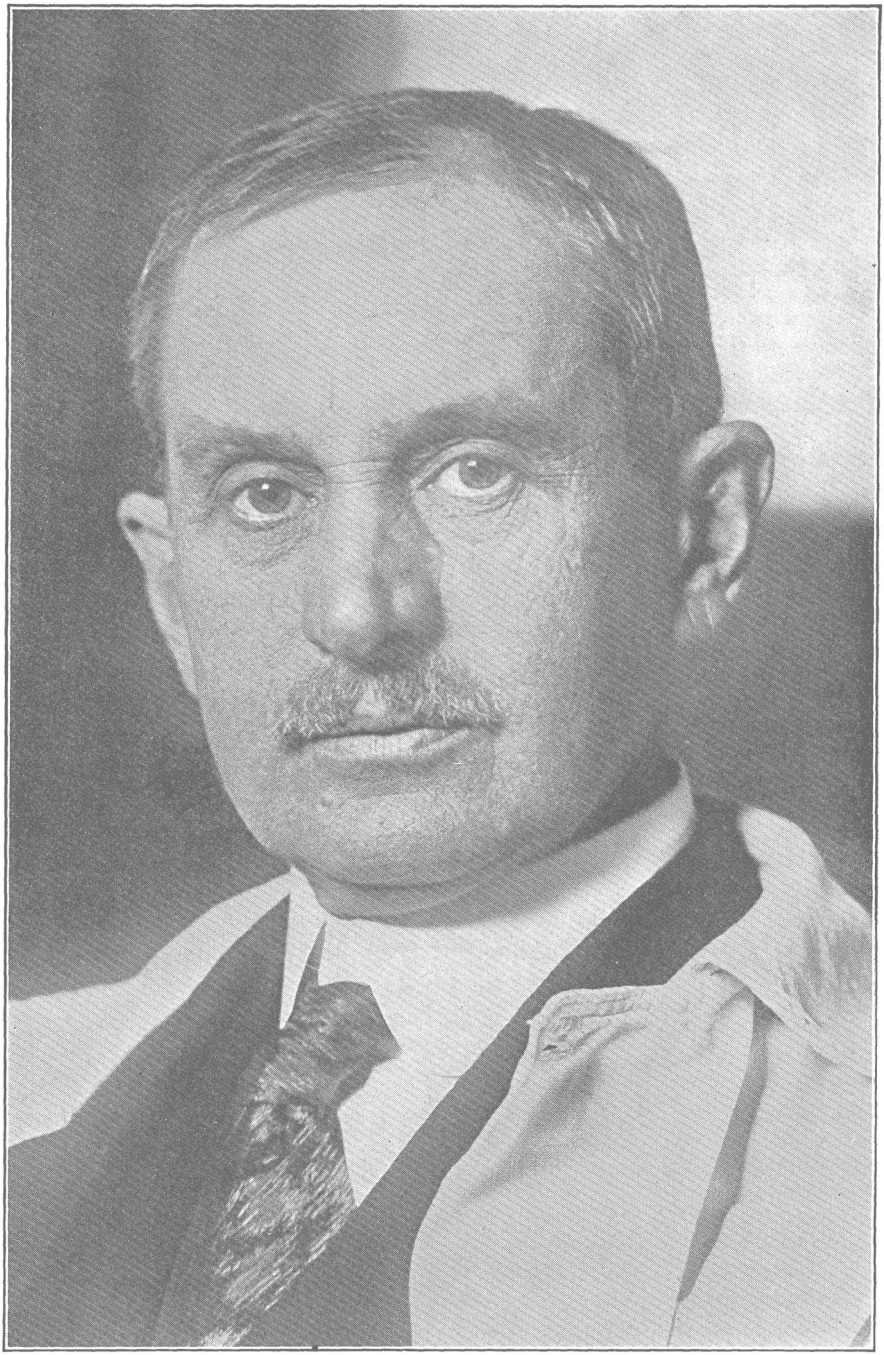

FRANKLIN PAINE MALL

THE PROGRESS OF SCIENCE

FRANKLIN PAINE MALL

FRANKLIN PAINE MALL, professor of anatomy in the Johns Hopkins Medical School and director of the Department of Embryology of the Carnegie Institution of Washington, was born in Belle Plaine, Iowa, September 28, 1862, and died in Baltimore, November 17, 1917, from complications following an operation for gall stones. He was the son of Francis and Louise (Miller) Mall, both of German descent. In 1895 he married Mabel Stanley Glover, of Washington, D. C. He is survived by his widow and two daughters, Margaret and Mary Louise Mall.

In 1883, he was graduated in medicine from the University of Michigan, and then went to Germany, where he studied first in Heidelberg and later under His and Ludwig in Leipsig. On his return to America he was first fellow in pathology in the Johns Hopkins University, then adjunct professor of anatomy at Clark University, professor of anatomy at the University of Chicago, and finally when the Johns Hopkins Medical School opened he undertook the direction of the new department of anatomy. When he started work, medical education in this country was at a very low ebb. He reorganized the teaching of anatomy by developing a laboratory in which his subject was taught by professional anatomists, devoted to scientific research, and his influence can be seen from the fact that twenty-five of the chairs in anatomy in different medical schools in this country have been filled from his department.

In science he ranks with the great leaders of his generation, and his work, embodied in one hundred and four publications, leads up to certain scientific generalizations. In anatomy he broke away from the study of pure morphology and studied structure from the standpoint of how all of the tissues of an organ are adapted to their function. This work led to the conception that most organs are made up of structural units which are equal in size and in function. The size of these ultimate histological units is determined by the length of the capillary. These ultimate histological units are grouped together into lobules in various ways in the different organs. These conceptions of structure find their best expression in Dr. Mall's studies of the intestine, the stomach, the liver and the spleen.

In the science of embryology Dr. Mall was the first to trace the development of an individual organ from its early embryonic form to its condition in the adult. For example, he followed the development of the loops of the intestine from their beginning, tracing through successive stages their displacement out into the cord, their return to the cœlom, and finally the establishment of their adult position. He determined the normal position of these loops in the adult, and then by experiments on animals showed that when they are displaced they tend to return to this normal position. This type of work may be summed up in the term "organogenesis." Through the complete development of organogenesis the study of anatomy may be rationalized, for thereby normal structure and the limits of variation may be understood.

The later years of his life were devoted to the organization of the Department of Embryology of the Carnegie Institution of Washington.

One of the most striking points in his career is that in these years, devoted to the organization of a new institute, he accomplished some of his best scientific work. He made an exhaustive study of the causes of monsters. To this study he brought a mastery of all the older literature on the subject, a critical judgment in analyzing the results of experimental embryology, and an extensive first-hand knowledge of abnormal embryos. He concluded "that monsters are not due to germinal and hereditary causes, but are produced from normal embryos by influences which are to be sought in their environment." They are due to causes bound up in their faulty implantation whereby alterations in the nutrition of the embryo at an early critical stage produce changes which range all the way from complete degeneration of the embryo up to a monster which survives to term.

In the new institute of embryology Dr. Mall proposed to complete the study of organogenesis and to analyze problems associated with growth which need for their solution large amounts of material and expert technical assistance.

In addition to his great contribution to the development of his science, Dr. Mall was a great teacher. He will be remembered as having trained a large group of the men who are now prominent in scientific medicine. He was one of the foremost men in the reorganization of the American Association of Anatomists, making it one of the distinguished scientific bodies in this country. He played a prominent part in the development of scientific publications in this country, being largely responsible for the establishment of the *American Journal of Anatomy*, the *Anatomical Record*, and finally the *Contributions to Embryology* published by the Carnegie Institution of Washington. He was a man of rare personality; modest, generous, original, unswervingly devoted to ideals and possessed of a genius for stimulating thought.

FLORENCE R. SABIN

A CRYSTAL MIRROR FOR FOCUSING X-RAYS

LIGHT rays may be focused either by passing them through a lens (Fig. 1) or by reflection from a concave mirror (Fig. 2). Although X-rays are known to be of the same nature as light, workers engaged in scientific research have found it impossible to focus them by the first method on account of their stubbornness in resisting refraction, or bending, in passing through ordinary matter, as light rays are bent and focused in passing through a lens. Moreover, difficulty presents itself in attempting to focus them by reflection, for the smoothest mirror that can be manufactured presents a "rough" surface to X-rays, causing them to be reflected diffusely rather than "regularly" (angle of incidence equal to angle of reflection), although presenting a "smooth" surface to light rays, and for the reason that the wave-lengths of X-rays are so very short compared with those of light.

X-rays have nevertheless been recently focused by reflection from a crystal mirror in the new Dershem X-ray concentrator.

It was found only four or five years ago that natural crystal surfaces are "smooth" enough to reflect X-rays regularly rather than diffusely. The idea occurred to Dr. Elmer Dershem, working in the physics laboratory of the University of Iowa, of making a concave mirror of crystal surfaces. Mica is the crystal that comes naturally to mind for such a purpose, as it can be readily split up into thin flexible sheets capable of bending to shape.